

ITEM 465
MANHOLES AND INLETS

465.1. Description. Construct manholes and inlets, complete in place or to the stage detailed, including furnishing and installing frames, grates, rings and covers. Drainage junction boxes are classified as manholes.

465.2. Materials. Furnish materials in accordance with the following:

- Item 420, “Concrete Structures”
- Item 421, “Hydraulic Cement Concrete”
- Item 440, “Reinforcing Steel”
- Item 471, “Frames, Grates, Rings, and Covers.”

Precast manholes, inlets, risers, and appurtenances are acceptable unless otherwise shown. Alternate designs for precast items must be acceptable to the Engineer and not deviate from the functional dimensions given. Alternate designs are to be designed and sealed by a licensed professional engineer.

- A. Concrete.** Furnish Class A concrete for cast-in-place manholes and inlets unless otherwise shown on the plans. Furnish Class A concrete or concrete meeting ASTM C 478 for precast manholes and inlets. Air-entrained concrete will not be required in precast concrete members.
- B. Mortar.** Furnish mortar composed of 1 part hydraulic cement and 2 parts clean sand. Hydrated lime or lime putty may be added to the mix to a maximum of 10% by weight of the total dry mix.
- C. Bricks.** Furnish first-quality, sound, perfectly shaped bricks. Provide clay or shale bricks that are homogeneous and thoroughly and uniformly hard-burned and that meet ASTM C 32, Grade MS or MM. Provide concrete bricks meeting ASTM C 55, Type I (Grade S-I). The maximum allowable water absorption of completely dry bricks is 16% by weight when submerged in water for 24 hr.
- D. Concrete Blocks.** Provide concrete blocks that meet ASTM C 139.
- E. Cast Iron or Aluminum.** Provide supports and steps conforming to the shape and dimensions shown on the plans that meet the requirements of ASTM A 48, Class 35B, for gray iron castings or ASTM A 536, Grade 65-45-12, for ductile iron castings. Steps may also be aluminum meeting ASTM B 221, Alloy 6005-T5. Provide steps in accordance with ASTM C 478, Section 16, “Steps and Ladders.”
- F. Timber.** Provide sound timber for temporary covers when used with Stage I construction (see Section 465.3, “Construction”) that is a minimum of 3 in. nominal thickness and reasonably free of knots and warps.
- G. Other Materials.** Commercial-type hardware of other materials may be used with prior approval.

465.3. Construction.

- A. General.** All types of manholes and inlets may be built either in 1 stage or in 2 stages, described as Stage I and Stage II. Build manholes and inlets designed to match

the final roadway surface in stages. Construct Stage II after the pavement structure is substantially complete unless otherwise approved by the Engineer.

Construct the Stage I portion of manholes and inlets as shown on the plans or as specified in this Item. Furnish and install a temporary cover as approved by the Engineer.

For Stage I construction of cast iron or steel inlet units, furnish and install the sewer pipe and a temporary plug for the exposed end of the sewer pipe from the storm sewer to a point below the top of curb indicated on the plans.

For Stage II, construct the remaining wall height and top of manhole or inlet and furnish and install any frames, grates, rings and covers, manhole steps, curb beams, or collecting basins required.

Construct precast manholes and inlets in accordance with Item 420, "Concrete Structures," or ASTM C 478. Construct cast-in-place manholes and inlets in accordance with Item 420. Forms will be required for all concrete walls. Multi-project fabrication plants (as defined in Item 424, "Precast Concrete Structures (Fabrication)") that produce manholes and inlets will be approved by the Construction Division in accordance with DMS-7340, "Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Manholes and Inlets." The Construction Division maintains a list of approved multiproject plants. Outside wall forms for cast-in-place concrete may be omitted with the approval of the Engineer if the surrounding material can be trimmed to a smooth vertical face. The outside form for concrete bases supporting brick walls may be omitted. Cast steps into the concrete walls when the concrete is placed, or drill and grout steps in place after concrete placement. Mortar steps into joints for brick walls. Use a full bed of mortar for brick work so the brick will thoroughly bond to the mortar. Construct full mortar joints no more than 1/2 in. wide for brick walls. Furnish a header course or bond course (laid perpendicular to the preceding courses) every fifth course of brick.

- B. Manholes and Inlets for Precast Concrete Pipe Sewers.** Construct manholes and inlets for precast concrete pipe sewers as soon as is practicable after sewer lines into or through the manhole or inlet locations are completed. Neatly cut all sewers at the inside face of the walls of the manhole or inlet and point up with mortar.
- C. Manholes and Inlets for Monolithic Pipe Sewers.** Construct bases for manholes and inlets on monolithic pipe sewers either monolithically with the sewer or after the sewer is constructed.
- D. Manholes for Box Sewers.** Cast bases for manholes for box sewers as an integral part of the sewer. Construct manholes before backfilling, or cover the manhole opening temporarily and backfill the sewer as a whole.
- E. Inverts.** Shape and route floor inverts passing out or through the manhole or inlet as shown on the plans. Shape by adding and shaping mortar or concrete after the base is cast or by placing the required additional material with the base.
- F. Finishing Complete Manholes and Inlets.** Complete manholes and inlets in accordance with the plans. Backfill to original ground elevation in accordance with Item 400, "Excavation and Backfill for Structures."

- G. Finishing Stage I Construction.** Complete Stage I construction by constructing the walls to the elevations shown on the plans and backfilling to required elevations in accordance with Item 400, "Excavation and Backfill for Structures."
- H. Stage II Construction.** Construct subgrade and base course or concrete pavement construction over Stage I manhole or inlet construction, unless otherwise approved by the Engineer. Excavate to expose the top of Stage I construction and complete the manhole or inlet in accordance with the plans and these Specifications, including backfill and cleaning of all debris from the bottom of the manhole or inlet.
- I. Inlet Units.** Install cast iron or steel inlet units in conjunction with the construction of concrete curb and gutter. Set the inlet units securely in position before placing concrete for curb and gutter. Form openings for the inlets and recesses in curb and gutter as shown on the plans. Place and thoroughly consolidate concrete for curb and gutter adjacent to inlets and around the inlet castings and formed openings and recesses without displacing the inlet units.

465.4. Measurement. All manholes and inlets satisfactorily completed in accordance with the plans and specifications will be measured by each manhole or inlet, complete, or by each manhole or inlet completed to the stage of construction required by the plans. Extension to inlets will be measured by each extension separately from the inlet.

465.5. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for as follows:

- A. Complete Manholes.** Payment for complete manholes will be made at the unit price bid for "Manhole (Complete)" of the type specified.
- B. Complete Inlets.** Payment for inlets will be made at the unit price bid for "Inlet (Complete)," of the type specified.
- C. Inlet Extensions.** Payment for inlet extensions will be made at the unit price bid for "Inlet Extension" of the type specified.
- D. Manholes Stage I.** Payment for Manholes, Stage I, will be made at the unit price bid for each "Manhole (Stage I)" of the type specified.
- E. Manholes Stage II.** Payment for Manholes, Stage II, will be made at the unit price bid for each "Manhole (Stage II)" of the type specified.
- F. Inlets Stage I.** Payment for Inlets, Stage I, will be made at the unit price bid for each "Inlet (Stage I)" of the type specified.
- G. Inlets Stage II.** Payment for Inlets, Stage II, will be made at the unit price bid for each "Inlet (Stage II)" of the type specified.

These price are full compensation for concrete, reinforcing steel, brick, mortar, aluminum and castings, frames, grates, rings and covers, excavation, and backfill and for all other materials, tools, equipment, labor, and incidentals.